



# CHALLENGES OF TEACHING SCIENCE AT THE HIGHER SECONDARY LEVEL IN NAGALAND

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## ABSTRACT

The National Education Policy 2020 emphasizes universal access to high-quality education as a method of advancing national development. India's leadership in scientific advancement will be crucial as it rises to prominence in the world scene. The study of science has evolved substantially in the 21st century and scientific education has become increasingly important. Science has advanced to the point that, it is projected that about 90% of the job field will be science-based. The educational objectives of NEP 2020 must be met by preparing students to be objective, inquiry-driven, critical thinkers, and problem solvers who can successfully navigate future obstacles. Consequently, science education needs to have a firm basis based on sound scientific ideas. Even though science education has become more popular in Nagaland, there are still a lot of shortcomings that need to be properly and methodically exposed. In order to achieve the educational objectives, this article discusses the status of science education in Nagaland at the secondary level, as well as the challenges that teachers face in the process of teaching. Additionally, the study will offer recommendations for resolving such issues.

**KEYWORDS:** *Challenges, Science Education, Higher Secondary Level*

## 1. INTRODUCTION

Science is the basis of all human lives. Behind every decision we make and every activity we do, we are directly or indirectly impacted by science. Science is an overall product of human activity in the form of a systematic and organised body of knowledge that is dynamic and ever expanding. It can transform life from poverty, fear and superstition to a progressive and liberating society. Advances in science and technology have no doubt brought about revolution in the field of agriculture and industry and hence, in the life of man.

NEP 2020 states that learning should be more experiential, comprehensive, integrated, inquiry-based, student-driven, discovery-oriented, adaptable, and, of course, enjoyable. Consequently, the focus of education must change from imparting knowledge to teaching students how to think critically, solve problems, be creative and multidisciplinary, innovate, adapt, and take in new information in areas that are developing and new.

As learning is becoming more and more important, children must learn, but even more crucially, they must learn how to learn. The emphasis of science education has to shift from memorizing scientific laws and principles to studying their ramifications and social repercussions, and more recently, from using science as a tool for social change (Valladares, 2021).

A developed nation prioritizes the advancement of its science education since it is believed that doing so would favourably impact all other areas of development (Suleiman & Elizabeth, 2018). Science education is seen as an essential and crucial component. The most crucial component in guaranteeing

a developed nation and a global leader has been "scientific advancement," and this is the best course of action for making use of the wealth of talent and resources in our country for the good of every individual, the community, the country, and the global community at large. However, a huge portion of the human population does not have access to modern science and technology.

### 1.1 Science education in India

The last two years of secondary school are known as Higher Secondary Education in India. After passing class 10, students at this level enroll in a core stream, such as the arts, science, or commerce stream. After the successful completion of class 12, other professional courses are available, such as Applied Science courses and Pure Science Courses. (Education in India)

### 1.2 Science education in Nagaland

Nagaland is the 16th state of the Indian union. It came into being on the 1st of December, 1963. Nagaland is located between 25°60" and 27°40" North latitude and 93°20" and 95°15" East latitude, with a geographical area of about 16,579 Sq. Km (0.5% of India's geographical area). Its population is 19, 78,502 (0.16% of India's population) as per 2011 census. The state is predominantly rural with 82.26% of the population living in villages.

The state is bounded by Assam in the north and West, Myanmar and Arunachal Pradesh in the East and Manipur in the South. The state comprises of seventeen administrative districts: Chumoukedima, Dimapur, Kiphire, Kohima, Longleng, Mokokchung, Mon, Niuland, Noklak, Peren, Phek, Shamator, Tuensang, Tseminyü, Wokha, Meluri and Zunheboto. Each

district has generally concentration of one the major/minor tribes of the state, thereby making each district distinct in their linguistic, cultural, traditional and socio-political characteristics.

The Nagas are greatly indebted to the enlightened educationists and missionaries such as Rev.Dr.Rivenburg and Rev. C.D.King who paved the way and opened the means for enlightenment and education.

The literacy rate in Nagaland has seen an upward trend of 79.55% as per 2011 census. In that, male literacy stands at 82.75% while female literacy is at 76.11%. This has shown marked improvement from 66.59% in 2001.

Science education at the Higher Secondary Level in Nagaland was offered for the first time at Kohima Science College, Jotsoma in 1961. Prior to that there were no institutions offering science education at the higher secondary level. Those interested few had to pursue their studies outside the state.

At present, the state has 51 schools offering Science Education under the Nagaland Board of School Education (NBSE) at the Higher Secondary Level out of which 14 are government and 34 are private.

Science education has slowly gained momentum since then, although the present scenario of science education is far from satisfactory (Pienyu. 2004)

### 1.2 Research question

1. What is the present status of science education in Nagaland in terms of enrolment and academic performance?
2. What are the various challenges faced by science teachers at the higher secondary level in Nagaland?

### 1.3 Objectives of the study

1. To find out the present status of science education at the higher secondary level in Nagaland in terms of enrolment and academic performance
2. To determine the challenges faced by science teachers teaching at the higher secondary level in Nagaland
3. To suggest suitable measures for promoting science education in Nagaland

### 1.4 Delimitation

The study is delimited to the science teachers teaching at the higher secondary level in Nagaland

## 2. REVIEW OF RELATED LITERATURE

A careful analysis of the reviewed literature indicated that there is a tendency toward fewer students studying science education at the higher education level since science education is not promoted as an appealing area like literature, business and politics. It was found that the main obstacles to promoting diversity in education were associated with inadequate curriculum development, challenges with language, gender-related concerns, the gap between the vast rural and urban areas, and a shortage of essential resources.(Chunawala & and

Nataranjan, 2010)

A prevalent concern that emerged from the literature review was the inadequacy of resources available for science education. (Mandina, 2012). It was found that there were insufficient laboratories and laboratory equipments. Lack of teaching resources and textbooks that weren't relevant to the local setting made it impossible to train people or find solutions to problems prevalent in the community. (Koul&Thomas,1997). Science teachers in government schools exhibited a lower level of role commitment. (Telima, 2018) According to Kumar and Singh (2017), textbook developers often disregard research findings and suggestions, resulting in an overloaded curriculum with insufficient time allotted for its coverage. This leads to a teacher-centered approach to teaching.

The negative perception of science education created by all of these factors, portrayed science education poorly leading to little interest and low enrolment in the science stream among students. Additionally, low interest in the subject was observed in both teachers and students. The primary cause of this was a deficiency of teaching resources. As per Kola and Jacob (2013), all these elements have a direct bearing on the low enrolment of science students in secondary education.

In the context of Nagaland, although Science Education has gained much popularity, there are still a number of inadequacies that need to be accurately and systematically unveiled through careful research studies. (Pienyu, 2014) Some of the common issues pertaining to science education frequently encountered are in relation to the curriculum, teaching-learning methods, negative attitude towards the subject, lack of infrastructures, laboratories etc.

An insightful understanding of the status and problem of Science Education is of utmost importance to find out the loopholes prevailing in our system. Research on Science Education is severely lacking in Nagaland. At this point, there is a great need for new and innovative ways to improve, motivate and attract young minds and generate enthusiasm towards Science Education backed by sound research.

## 3. METHODOLOGY

The present study uses descriptive survey method wherein open ended interview of science teachers were conducted to draw out their opinions on the challenges encountered in teaching science at the secondary level,

### 3.1 Population:

The population of the study includes science teachers teaching at the higher secondary level in Nagaland

### 3.2 Sample

The sample of the study comprises of 15 teachers teaching science at the higher secondary level in Nagaland

### 3.3 Sampling technique

The study is a descriptive study and purposive sampling technique was used for the selection of schools and teachers

teaching at the higher secondary level under science stream in Nagaland.

### 3.4 Data collection

The data for the present study included both primary and secondary sources. The primary sources of data consisted of 15 teachers teaching science at the higher secondary level

## 4. ANALYSIS OF DATA

This study used qualitative data analysis. The data collected from the teachers were carefully processed and the emerging concepts were recognized and their interconnections were analysed in terms of the objectives of the study

## 5. FINDINGS AND DISCUSSION

The data gathered by the researcher during the one on one interview revealed the different challenges they encountered in teaching science at the higher secondary level. The major findings of the study are as follows:

### 5.1.1 Status of Science Education at the higher secondary level in Nagaland

DISTRICTS	NO. OF GOVT. SCHOOLS	NO. OF PRIVATE SCHOOLS
KOHIMA	3	9
DIMAPUR	1	14
CHUMOUKEDIMA	1	7
MON	1	1
TUENSANG	1	1
WOKHA	1	-
MOKOKCHUNG	2	1
NOKLAK	1	-
PEREN	1	1
PHEK	2	-
KIPHIRE	1	-
LONGLENG	1	-
ZUNHEBOTO	1	-
TOTAL	17	34

**Table 1:** Higher Secondary Schools offering Science Stream- District Wise. (result gazette NBSE)

As per the data collected from NBSE result gazette 2024, Nagaland has 51 schools offering Science Education under the Nagaland Board of School Education (NBSE) at the Higher Secondary Level. There are seventeen government higher secondary schools one (1) each from the districts of Dimapur, Chumoukedima, Wokha, Peren, Zunheboto, Mon, Tuensang, Noklak, Longleng, Kiphire, three (3) from Kohima district and two (2) from Mokokchung and Phek districts offering science stream. There are thirty four private schools offering science education at the higher secondary level. A total of nine (9) schools under the state capital Kohima, fourteen (14) higher secondary schools under Dimapur district, seven (7) under Chumoukedima district and one (1) each under Mokokchung, Peren (Jalukie), Mon and Tuensang districts

### 5.1.2 Enrolment And Performance Status

The present enrolment and performance status of science students at the higher secondary level in Nagaland is discussed in comparison to the year 2020.

#### a. Government Institutions

Category	Enrolled 2021	Enrolled 2024	Pass% 2021	Pass% 2024
Male	151	134	92%	60.90%
Female	135	186	94.03%	77.42%
<b>Total</b>	<b>286</b>	<b>320</b>	<b>92.96%</b>	<b>70.53%</b>

**Table 2:** status and performance of students studying in Government Institutions at the Higher Secondary level under Science Stream in Nagaland (Result gazette, NBSE 2021 and 2024)

The total number of students enrolled in government institutions under science stream at the higher secondary level in 2021 was 286 out of which there were 151 males and 135 females. In the year 2024, the total number of students enrolled in government institutions under science stream at the higher secondary level is 320 out of which 134 are male and 186 are female.

The total pass percentage of the students in the year 2021 was 92.96% out of which male pass percentage is 92% and female pass percentage is 77.42%. The total pass percentage of students in the year 2024 is 70.53% out of which 60.90% are male and 77.42% are female.

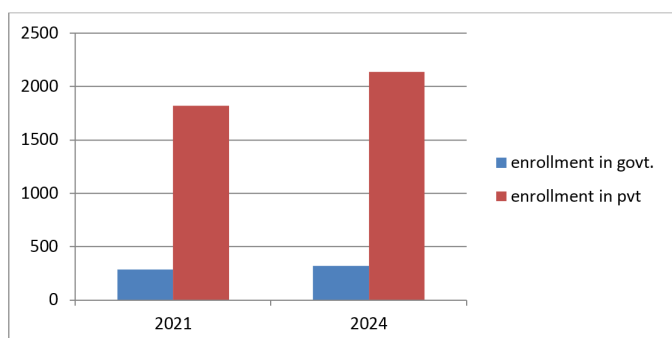
From the above data it can be concluded that the total enrolment of students under government institutions under science stream in 2024 has slightly increased compared to the year 2021.

Data also shows that the total pass percentage of students in the year 2021 (92.96%) is comparatively better than the performance of the students in the year 2024 (70.53%). This leads to the conclusion that the overall performance of science students at the higher secondary level in government institutions has declined considerably

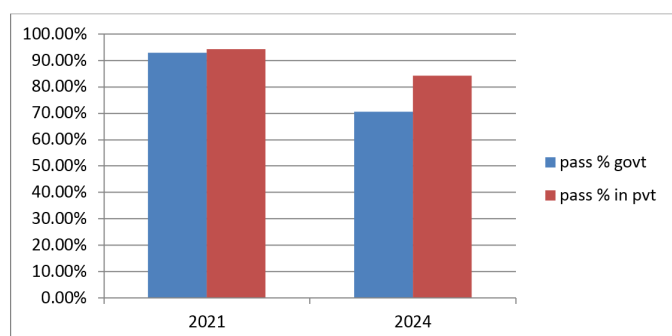
#### b. Private Institutions

Category	Enrolled 2021	Enrolled 2024	Pass% 2021	Pass% 2024
Male	843	911	91.74%	81.81%
Female	975	1228	96.60%	86.02%
<b>Total</b>	<b>1818</b>	<b>2139</b>	<b>86.31%</b>	<b>84.23%</b>

**Table 3:** status and performance of students studying in private Institutions at the Higher Secondary level under Science Stream in Nagaland (NBSE result gazette, 2021, 2024)



**Figure 1:** Enrollment of students in 2021 and 2024 under government and private institutions



**Figure 2:** Pass percentage of students in 2021 and 2024 under government and private institutions

The above data shows that the total number of students enrolled in private institutions under science stream at the higher secondary level in the year 2021 is 1818 out of which there are 843 male and 975 female students. In the year 2024, the total number of enrolment is 2139 out of which there are 911 male and 1228 female students.

The total pass percentage in 2021 is 94.35% out of which male pass percentage is 91.74% and female pass percentage is 96.60%. In the year 2024, the total pass percentage is 84.23% out of which male pass percentage is 81.81% and female pass percentage is 86.02%.

The data clearly shows that the total number of enrolment of science students under private institution at the higher secondary level has increased in 2024 compared to the year 2021.

The total pass percentage however, does not show an encouraging trend where students performed better (94.35%) in 2021 than in the year 2024 (84.23%).

Academic performance in science may decline for a number of reasons, including low motivation or interest, gaps in knowledge, and technological or personal distractions. Some causes could include poor curriculum design or implementation, insufficient resources and support for teachers, or both. Finding the precise causes and creating focused remedies are crucial to addressing declining performance in science. This could entail assessing students to find knowledge gaps, improving professional development and training for teachers, giving struggling students adequate support, updating the curriculum,

and promoting hands-on learning etc, among others.

### 5.1.3 Challenges In Teaching Science At The Higher Secondary Level In Nagaland

The current science education at the higher secondary level is a complex and multi faceted issue. Some of the major challenges in teaching science at the higher secondary level in Nagaland are:

*i. Attitude of students toward science:* attitudes toward science held by both teachers and students are a significant factor that influences scientific literacy and how people engage with science in their daily lives. (Lu et al. 2022). The teachers felt that most of the students in Nagaland did not have a positive attitude towards science. This proved to be a major barrier for the teachers in meeting their goals and the effectiveness of their instructions.

*ii. Teaching-Learning process:* In Nagaland, many factors were found to hamper the teaching- learning process:

*a. Inadequate laboratories:* Absence of adequate facilities in Science laboratories due to various reasons hampers the inquisitive nature and interest in the subject of not only the learners but also the teachers.

*b. Inadequate teaching aids:* Teachers face difficulty in integrating practical work into their teaching process due to unavailability of efficient instructional materials or take too much time.

*c. Disparity in the ability to learn:* There is a significant difference in learning abilities between Nagaland and the rest of the nation. As per the annual education status report 2017 published by The Telegraph, 30.4% of pupils in Nagaland's 14–18 year old age group are proficient in basic division, compared to the national average of 43.1%. In addition, it found that just 37.7% of people can perform calculations and evaluations, compared to the average of 50% at the national level.

While every child has different level of intellectual capabilities and learning style, the teachers find it difficult to address each students needs to meet the educational goals due to time restrictions and limited resources.

*iii. Digital connectivity:* Particularly in the state's rural areas, unstable electricity, inadequate or nonexistent cell networks, and internet connections pose a significant barrier especially for the teachers to prepare their lessons ahead of their classes.

*iv. Finance/funding:* One of the biggest problems facing the state's educational institutions is underfunding. As such, educational institutions are unable to grow into fields where teachers stand to gain greatly, such as research for professional development and online training facilities.

*v. Commitment of teachers:* The majority of private schools in Nagaland offer meagre salaries for teachers. This is a significant barrier for teachers to fully commit themselves to their work, which leads to a lack of motivation. The reluctance of professionals to work in rather remote and inaccessible regions of the state is a major obstacle to the successful implementation



of science education.

**vi. Lack of experience:** Teachers who have fewer years of experience in teaching, face problems with classroom assessment and management due to lack of training, limited subject matter knowledge in specific science areas.

**vii. Students lack of self efficacy:** Individuals who have low self-efficacy tend to stay away from difficult undertakings. They think they are incapable of handling challenging situations and tasks. It is extremely difficult for teachers to address the various demands of their pupils in their developmental contexts and maintain their motivation to successfully complete their coursework.

#### **viii. Limited knowledge of ICT**

Limited ICT knowledge among teachers, Unreliable internet connections, and financial constraints are some of the issues that prevent computer-based technology from being used effectively in the teaching-learning process among science teachers.

### **5.2 Implications Of The Study**

- Most of the schools in Nagaland today have subpar facilities in terms of infrastructure,
- Challenges like low ICT literacy among teachers, unstable internet connections, and cost barriers hinder the effective utilization of computer-based technology in science instruction. Overcoming these obstacles through ICT training, workshops and encouraging appropriate technology use can enhance teaching quality and student learning outcomes in science education. Collaborative efforts between researchers, developers, and teachers are essential for leveraging technology to personalize instruction and empower teachers in science teaching.
- It is imperative to alleviate financial barriers, improve teacher salary, support quality teacher preparation, equip teachers with instructional expertise, capacity building and improve their working conditions. Long-term teacher retention can also be facilitated by bridging the theory-practice divide through practice-based professional development.
- There is a gap between the theoretical understanding of teachers and their practical use of that information in the classroom. Using a range of teaching strategies, looking into students' alternative conceptions, and putting inquiry-based activities into practice can also be difficult for teachers. All things considered, these difficulties show how much assistance and professional growth science teachers require to get beyond their obstacles and start using practical in the classroom
- Flexibility is crucial, allowing teachers to embrace different ideas and perspectives, to adapt their teaching methods and approaches to suit diverse situations

### **6. SUGGESTIONS FOR PROMOTING SCIENCE EDUCATION**

- Implement a constructivist method, whereby students construct their own understanding through personal

experiences. Teachers play a crucial role in facilitating students' learning and understanding of this.

- The basis of science education is experimentation. Students can learn actual scientific principles through experiments in an engaging and practical manner. For this, a well equipped science laboratory is imperative across the schools.
- To Increase investments in Science and Technology: If we wish to thrive as a nation, we need to focus on and expand opportunities in all areas of science and technology.
- Educational Resources: Rather than expecting teachers to make their own or find educational resources online, it is important to make sure teachers have access to high-quality teaching materials and assistance to match the requirements of their students.
- Professional learning: Putting a stronger emphasis on aiding educators in utilizing excellent teaching resources is one method to enhance professional development opportunities, and capacity building.

### **7. WAY FORWARD**

The data gathered from this study revealed the different challenges teachers encounter in teaching science at the higher secondary level. The major challenges include insufficient laboratory materials, insufficient funding, negative attitude of the students towards the subject, low self –efficacy among the students, and little or no proficiency with ICT facilities, lack of commitment and lack of experience among teachers

Science education in schools needs to change with the times to help young people become citizens who can contribute to shaping the society in which they will live. In the long run, we have no choice but to make significant investments in enhancing school workshops and laboratories, while simultaneously minimizing external exams and encouraging an experimental culture within our classrooms. It is imperative that science teachers are given the freedom to experiment with creative ways of teaching.

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